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Woonhee Sung

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Classifying Learning Management Platforms by Examining Features and Educational Affordances

APPROVED BY

SUPERVISING COMMITTEE:

Supervisor: _____

Min Liu

_____

George Veletsianos

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by

Woonhee Sung, B.A.

Report

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Classifying Learning Management Platforms by Examining Features and Educational Affordances

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Woonhee Sung, M. A.

The University of Texas at Austin, 2011

SUPERVISOR: Min Liu

Learning management systems(LMSs) have become one of the most common computer systems adopted at universities, colleges and distance learning organizations. In order to identify different features and affordances of each LMS, LMSs' features were compared by using four different categories; communication tools, productivity and student involvement tools, course delivery tools, and administration tools. Based upon the comparison of the different features affecting different usage patterns, this paper proposes a classification of seven selected LMSs; ANGEL, Blackboard, Moodle, Sakai, WebCT, Ning and Elgg. These seven LMSs are classified into three groups according to systems' pedagogical adaptability and technological usability. The classification seeks to understand the possibilities and limitations of what these classified groups of LMSs can accomplish and is used to suggest a suitable usage in order to support teaching and learning. The proposed classification implies the need of future exploratory case study analyzing teaching and learning practices according to the classification.

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CHAPTER 1. INTRODUCTION

The main agents of change in education can be initiated by diffusing and taking new technologies that have given rise to a networked society. The evolution of the Internet and Web 2.0 tools is resulting in significant transformation enabling the formation of self-organizing communities and collaborative activities in higher education arena (Lee & McLoughlin, 2010). The advent of Web 2.0 and social software systems resulted in shifting the views of how to support education with a growing emphasis on new educational approaches and pedagogies that foster online learning. The Internet technologies of the Web2.0 generation have been mainly characterized by social participation, as listservs, interest groups, discussion board, and Web-based communities can link people around the world (Molnar, Karpati, & Aoki, 2009). Simultaneously, the growth of Web 2.0 and the combination of web 2.0 tools have potential to remove the barrier of isolation that many distance learners have complained of in the past. The Internet has become a global communication tool to reach effective communication and information for education in today's connected world (Uzunboylu, Ozdamli, & Ozcinar, 2006).

In the last few years, integrated computer systems known as Learning Management Systems (LMSs) or Course Management Systems (CMSs) have rapidly emerged and had profound effects on university teaching and learning by enlarging the notion of student involvement and engagement, "generally considered to be the predictors of learning and personal development" (Kuh, 2003, p. 25). LMSs or CMSs

are designed to supplement traditional classroom-based learning or deliver distance learning. Distance education allows students to participate and immerse themselves in online learning environments which the delivery of the content are handled through the implementation of LMS technologies. LMSs have made it easy to provide "online user education," supporting traditional (face-to-face) classroom instruction (Rutter & Matthews, 2002). In order to augment traditional instruction, this hybrid or mixed delivery approach allows instructors to combine the advantages of online class learning with the benefits of face-to-face interaction with relatively limited technological sophistication on their part (Edling, 2000).

Many CMSs or LMSs are available for higher education (Doyle, 2005), but a few such as Blackboard, Desire2Learn, or WebCT have become a prominent resource at colleges, universities and distance organizations in U.S (Morgan, 2003). Moreover, many innovative learning management systems such as open source system including Sakai Project and Moodle have arisen and inspired by the way how open social software supports user interactions, content managements and flexibilities. Stevens (2007) classified open-source LMSs from relatively flat but open source learning that accommodates content management (such as Moodle and Drupal) (Stevens, 2007) to richer facilities integrating the platform from social networking tools (e.g. Elgg and Ning), and beyond (e.g. Second Life).

Despite of the different features and theoretical background of CMSs such as Blackboard and WebCT and open-source LMSs, there has been no research on classifying current CMSs and LMSs regarding different platforms, technological features and pedagogical utilities. While there are many meaningful articles about

LMSs providing specific evidence for the implementation and utility of individual LMS functions, there is currently little research encompassing newly designed open-source LMSs or social networking platforms such as Elgg, Ning, ANGEL and Moodle in a comprehensive way.

Therefore, this paper proposes a classification of LMSs by identifying different technological features and possible pedagogical utilities in educational settings.

In chapter 2, the distinction among social software tools is discussed and definitions of CMSs, LMSs and LCMSs are reviewed. Chapter 3 compares different concepts and technological features of the selected LMSs; Blackboard, WebCT, Moodle, Sakai, ANGEL, Ning and Elgg according to the categories; 1)communication tools; 2)productivity/student involvement tools; 3)course delivery tools and 4)administration tools.

After examining four categories of each LMS, the classification of theses LMSs is proposed in chapter 4 in association with Lambert's (2008) learning framework. The proposed classification of LMSs will be explained in relation to system acceptability and pedagogical utility. At the end, the implication of future research is discussed.

CHAPTER 2. WEB 2.0 AND LEARNING MANAGEMENT SYSTEMS

This chapter discusses the social trends with the development of Web 2.0 phenomenon which fostered the rapid development and adaptation of LMSs in combination with social software tools in higher education. By looking at the categories of social software proposed by Mejias (2005), I will briefly discuss social software tools for learners in the Web 2.0 era. Definitions and descriptions of CMSs, LMSs, and Learning Content Management Systems(LCMSs) will be reviewed in order to categorize the type of LMSs according to features and affordances.

Web 2.0 and social trends

Traditional commercial LMSs and newly emerged LMSs have been affected by the social trends with Web 2.0 phenomenon. While it is not my intention to discuss the scope of the Web 2.0 phenomenon and social software tools, it is helpful to give some background that empowers the rapid evolution of LMSs. Therefore, this chapter describes current trends in Web 2.0 era in relation with the development of LMSs.

We refer to contemporary times as the “information age” or “knowledge based society”, with the advent of Web 2.0 technologies. The information age is characterized by the diffusion of “information and communications technologies” and the increasing demand of professors and students for new educational approaches and pedagogies (Fischer & Konomi, 2005). In the higher education arena, there are shifts in the views of what education is for (McLoughlin & Lee, 2007). Klamma, Chatti, Duval, Hummel, Hvannberg, Kravcik, Law, Naeve, and Scott (2007, p72) have argued that “emergent

new Web 2.0…concepts and technologies are opening doors for more effective learning and have the potential to support lifelong competence development." Although there are multiple interpretations of the term "Web 2.0", McLoughlin and Lee (2007) defined it broadly as follows:

> Web 2.0 is a second generation, or more personalized, communicative form of the World Wide Web that emphasizes active participation, connectivity, collaboration and sharing knowledge and ideas among users
>
> (McLoughlin & Lee, 2007, p.665).

Among many Web 2.0 applications such as wikis, blogs, Really Simple Syndication(RSS), podcasting, tag-based folksonomies, media sharing utilities, and social software, social software tools have emerged as a major component of the Web 2.0 movement (Alexander, 2006). In order to identify the relationship between Web 2.0 and social software, Cooke and Buckley (2008, p277) defines Web 2.0 as "the new generation of tools and services that allow private individuals to publish and collaborate". Cooke and Buckley (2008) quoted as follows:

> Web 2.0 is about making computing and media social and is built around 'social software' that enables people to connect or collaborate through computer-mediated communication and, to form online communities.
>
> (Cooke & Buckley, 2008, p277)

Social software, the main applications of Web 2.0 generation, is the term that

embraces blogs, wikis, trackback, podcasting, video-blogs, and social networking tools rather than perceived as the separate tool. The term "social software" may be broadly defined as "software that supports group interaction" (Shirky, 2003, para.2), with the emphasis on customization, personalization and rich opportunities for networking and collaboration. The definition and features of social software can be also applied to educational LMSs. Due to the rich and varied features that encompass Web 2.0 applications it is difficult to define boundaries of each application. Only a few researchers, McLoughlin and Lee (2007) and Mejias (2005) tried to classify types of social software. McLoughin and Lee (2007) adopted the categories listed in Table 1 proposed by Mejias in 2005 to discuss social software tools for learners in the Web 2.0 era.

Table 1. Types of social software (based on Mejias, 2005, p.3)

Social software category	**Examples**
Multi-player online gaming environments/virtual worlds	Multi-User Dungeons (MUDs);Massively-Multiplayer Online Games(MMOGs) such as Second Life, Active Worlds, World of Warcraft, Everquest
Discourse facilitation systems	*Synchronous*: Instant messaging(IM, e.g. Windows Live Messenger, AOL Instant Messenger, Yahoo Instant Messenger, Google Chat, ICQ, Skype); Chat *Asynchronous*: Email; bulletin boards; discussion boards; moderated commenting systems (e.g. K5, Slashdot, Plastic)

(Table 1. Cont)

Product development systems	Sourceforge; Savane; LibreSource
Peer-to-peer file sharing systems	BitTorrent; Gnutella; Napster; Limewire; Kazaa; Morpheus; eMule; iMesh
Selling/purchasing management systems	eBay
Learning management systems	Blackboard/WebCT; ANGEL; Moodle; .LRN; Sakai; ATutor; Claroline; Dokeos
Relationship management systems	MySpace; Friendster; Facebook; Faceparty; Orkut; eHarmony; Bebo
Syndication systems	List-servs; RSS aggregators
Distributed classification systems ("folksonomies")	*Social bookmarking:* del.icio.us; Digg; Furl *Social cataloguing* *(books):* LibraryThing; neighborrow; Shelfari *(music):* RateYoutMusic.com; Discogs *(movies/DVDs):* Flixster; DVDSpot; DVD Aficionado *(scholarly citations):* Bibsonomy; Bibster; refbase; CiteULike; Connotea *Other*: Flicker

In the article, Mejias(2005) explores the role that social software can play in new models of learning and participating in society. The list in Table 1 is proposed by Mejias (2005) to organize the kinds of applications in association with social software.

> As with all labels, there is some ambiguity and controversy over what kinds of things are supposed to be included under the 'social software'

> label, or how it differs from previous labels such as ‘collaborative software,’ ‘groupware,’ etc. (Mejias, 2005, p.2)

As it is quoted above, the intention is “to arrange technologies according to the kinds of social function they seek to manage” (Mejias, 2005, p.3). Most social software products listed above are not working exclusively; most software products incorporate several functions across the categories and serve more than one need of a particular audience. LMSs are not the exception. LMSs appear to incorporate and adopt diverse functions from more than one category. McLoughlin and Lee (2007) and Mejias (2005) noted that we should not make the assumption that LMSs are the exclusive and the only type of social software capable of facilitating learning. Even though LMSs had been slow to incorporate profound and multifaceted increase in communication and interaction capability in early stage (Mejias, 2005), LMSs are now constantly evolving, adopting new features in existing products and introducing completely new products altogether.

The social trends move towards offering all possible features for enhancing the effectiveness in teaching and learning by providing social software features.(Craig, 2007; Malikowski, Thompson, & Theis, 2007). The adaptations of social software tools in LMSs result in blurring the distinction between LMSs and other social software tools or even within LMSs as well. Therefore, it will be helpful to define the boundaries of LMSs before examining various LMSs according to its pedagogical affordances and technical features.

An overview of Learning Management Systems

LMSs grew from a range of multimedia and internet developments in the 1990s (Coates, James & Baldwin, 2005). With the rapid evolution of technology over the past 20 years, LMSs have become essential components in higher education with the development of international standards for LMSs (Coates et al., 2005). Given the rise of e-learning and the predominance of the LMSs, this section seeks to summarize prior research and analysis of LMSs.

In 2005, Coates et al. (2005) stated that "the LMSs have matured and been adopted by many universities across the world. Coates et al. (2005) acknowledged that LMSs are also referred to as "learning platforms", "distributed learning systems", "course management systems", and "instructional management systems" (Coates et al., 2005, p. 20). The common theme across the terms is that they combine a range of course or subject management and pedagogical tools to provide a means of designing, building and delivering online and hybrid learning.

To date, there are no unified terms for describing learning management tools while several terms are used in different researches. Course Management Systems (CMSs) were often used for indicating commercial course management systems such as Blackboard or WebCT in early stage. Craig (2007) used the term Managed Learning Environment (MLEs) implying learning environments with a focus on Collaboration, technical interoperability and customizable learning experiences. Craig (2007) differentiated the terms among Managed Learning Environments (MLEs), Learning Management Systems (LMSs) and Learning Content Management Systems (LCMSs). Paulsen (2002) also provided the definition of terms; LMSs and LCMSs. In order to

understand the distinctions among each term, CMSs, LMSs and LCMSs, Table 2 provides detailed descriptions of each term from a few researchers' points of view.

Table 2. Definitions and descriptions of CMSs, LMSs, and LCMSs

Terms	Researchers	Definitions	Descriptions
Course Management Systems	Malikowski, Thompson, & Theis (2007, p.150)	CMSs are fundamentally a technology or media being used for learning and provide an integrated set of Web-based tools for learning and course management	Allows instructors to transmit information to students; syllabus, assignments, materials and announcements. Interactive tools allow people to communicate synchronously or asynchronously. Allows students to interact with computers.
	John Meerts (2003, p.1)	A tool that allows an instructor to post information without instructors' expert knowledge about HTML or other computer languages.	CMSs provides an instructor with a set of tools allow relatively easy creation of online course content for teaching and managing the course including various interactions with students.
Learning Management Systems	Morten Flate Paulsen (2002, p.5)	LMSs are used for a wide range of systems that organize and provide access to online learning services for students, teachers, and administrators.	These services usually include access control, provision of learning content, communication tools, and organizations of user groups.

(Table 2. Cont)

	Kaplan-Leiserson (2000)	Software that automates the administration of training events.	The LMS registers users, tracks courses in a catalog, and records data from learners; it also provides reports to management. An LMS is typically designed to handle courses by multiple publishers and providers. It focuses on managing courses created by a variety of other sources.
	Hall (2001)	An LMS is software that automates the administration of training events.	All Learning Management Systems manage the log-in of registers users, manage course catalogs, record data from learners, and provide reports to management.
Learning Content Management Systems	Kaplan-Leiserson (2000)	A software application that allows trainers and training directors to manage both the administrative and content-related functions of training.	An LCMS combines the course management capabilities of an LMS (learning management system) with the content creation and storage capabilities of a CMS (content management system).

(Table 2. Cont)

	Hall (2001)	A learning content management system is an environment where developers can create, store, reuse, manage and deliver learning content from a central object repository, usually a database.	LCMS generally work with content that is based on a learning object model. These systems usually have good search capabilities, allowing developers to find quickly the text or media needed to build training content.
	Craig (2007)	An LCMS is mature learning content management systems extend beyond the initial achievements of LMSs.	An LCMS incorporates collaboration tools, assessment and analytics, and compliance to accepted standards such as SCORM

There are more terms that are often used as synonyms to LMSs such as learning platform, virtual learning environments or content management systems. CMSs and LMSs have been used interchangeably in research articles; however, the definitions described in Table 2 show distinctions between two terms. As John Meerts (2003) described, a CMS is a technology tool that is already designed and configured by companies to meet the basic criteria for managing courses online.

Pollack (2003) also defined a CMS as "a technology tool that supports and enhances the learning process" (p. 5). CMSs and LMSs are the most common terms in describing online course managing tools in higher education, however, the definitions in Table 2 show that LMSs are more frequently associated with flexible features that support a broad array of learning activities and pedagogical theories. In this sense,

CMSs refer to more flat type of platforms whereas LMSs are more ideal for e-learning programs in terms of the customizability and flexibility. Similarly, LMSs can also handle a broader range of registration and related tasks than CMSs, because they were designed to do so.

Likewise, there used to be a distinction among different terms in relation to the focus and service that each system provides. Understanding the distinction among the terms can be very confusing because most of the LCMS systems also have built-in LMS and CMS functionalities. LCMSs include LMS functionalities as part of the system. Therefore, Paulsen (2002) mentioned that the term LMS is more likely to describe a wide range of applications that supports learning environments and thus, this paper chooses the term LMS in describing broad range of course managing tools.

Coates et al.(2005) also described that LMSs share common features among themselves. While the precise specifications vary from system to system, they typically provide tools for course administration and pedagogical functions of differing sophistication and potential:

- Asynchronous and synchronous communication (announcement areas, e-mail, chat, list servers, instant messaging and discussion forums);
- Content development and delivery (learning resources, development of learning object repositories and links to internet resources);
- Formative and Summative assessment (submission, multiple choice testing, collaborative work and feedback); and
- Class and user management (registering, enrolling, displaying timetables,

managing student activities and electronic office hours)

(Coates et al., 2005)

The four common features of LMSs presented by Coates et al.(2005) share similarities with Malikowski, Thompson, and Theis'(2007) model categorizing LMS features in combination with technical features and learning research to enable a synthesis of research across different LMSs. The five categories are (a) transmitting course content; (b) evaluation students; (c) evaluating course and instructors; (d) creating class discussions; and (e) creating computer-based instruction (Malikowski, Thompson & Theis, 2007, p167).

The categories illustrated by Malikowki et al.(2007) are about specific technical features whereas Coates et al.(2005) considers pedagogical functions in categorizing features. Thus, Coates et al.(2005) suggests broader categories illustrating key tools and functions in parenthesis that correspond to specific technical features described by Malikowki et al.(2007).

Not all LMSs share all features in one platform; they rather focus on features that foster a specific learning goal according to teaching strategies. It is true that all type of LMSs typically allow various tools to be implemented as users' needs. Despite of the scalable and customizable features enough to support users' various needs, Malikowski et al.(2007) found that LMSs are primarily used to transmit information to students. Universities are using the LMS for administrative purposes with only limited impact on pedagogy (OECD, 2005).

Within limits, the structures, processes, and online appearance of the LMSs can be customized; therefore, if researchers wish to improve LMS implementations, it is

needed to start with the features that are used most, especially since all LMS features have many technical and pedagogical options. Given the rise of e-learning and the predominance of the LMSs, the challenge is not to promote uptake but to encourage, enable and facilitate effective implementation of LMSs that is likely to have significant impact on student learning. To make this happen, it is imperative to extend existing knowledge about LMSs by studying the evolution of LMSs in association with the advent of social software tools.

Evolution of Learning Management Systems

After reviewing the scope of social software to identify the category where LMSs belong to, the definitions and common features of LMSs are examined. This section will review a current state of LMS developments along with the Web 2.0 tools and social software technologies.

Traditional CMSs such as Blackboard and WebCT emerged more from entrepreneurship and technological affordances than from models of instructional design (Morgan, 2003). These commercial efforts have led to an impressive level of CMS adoptions by providing workshops for instructors and professional developments. However, there have been several researchers studying successful adoptions of CMSs to avoid weaker procedure and poor learning results (Malikowski et al., 2007).

Therefore, a new set of LMSs such as open-source LMSs and education-based social networking platforms are released along with the growth of social software technologies. Dieu and Stevens (2007) described a social network as follows:

A social network is a collection of individuals linked together by a set of

> relations which, in the online environment, incorporates their common interests, affinities and the possibility of producing, collecting, sharing and re-mixing artifacts (e.g., posts, comments, photos, stories, films, songs...).
>
> A new generation of social media (blogs, wikis, podcasts, and photo sharing and social networking sites) and a set of "harvesting" technologies such as syndication (RSS, Atom), aggregation, folksonomies and mash-ups are available for users to house this production, share it, collect information on others and collaborate more efficiently.

(Dieu and Stevens, 2007, p.2)

As Dieu and Stevens (2007) described a new generation of social media, there are emerging platforms that integrate social networking features with educational learning system to allow people to easily connect and share resources. Dieu and Stevens (2007) introduced three social networks; Elgg, Ning and Facebook. In this paper, Elgg and Ning will be included which have been actively used as LMSs in higher education and gained popularity as an alternative LMSs (Kumar & Dutta, 2011). Because of the distinctive features Elgg and Ning possess, these alternative types of LMSs are often called education-based social networking platforms. Before starting the next chapter, a simple explanation of Elgg and Ning is provided as follows:

Elgg <http://elgg.org>, is an open source software platform which allows you to create a social network and host it on your own infrastructure, modifying the features to fit your specific needs.

Figure 1: A sample screenshot of Elgg interface

Users establish personal digital identities and connect with other people, collaborate with them and discover new resources through their connections. Plug-ins allow users on different social networks to collaborate, and provide specific functionality for tasks like project management, mobile browsing and collaboration through user-controlled wikis.

Ning <http://ning.com>, is an online service where you can create, customize,

and share your own Social Network. It allows a combination of features (videos, blogs, photos, forums, profiles, RSS and text boxes), customization of pages, and two levels of privacy.

Figure 2: A sample screen shot of Ning

CHAPTER 3. A COMPARISON OF LEARNING MANAGEMENT SYSTEMS

Higher education is confronting a dual challenge in identifying learning goals that can be achieved through the use of online LMSs, and selecting appropriate LMSs to create educational affordances by adopting a certain LMS. Given the different concepts of usage and features between different types of LMSs, a comparison and classification of LMSs can help researchers to expect pedagogical effects of a certain category.

Comparison of Learning Management Systems

This chapter will compare different types of selected LMSs; Blackboard, WebCT, Moodle, Sakai, Angel, Ning and Elgg by examining feature under the categories as follows:

- Communication tools
- Productivity / Student involvement tools
- Course Delivery tools
- Administration tools

These seven LMSs are selected after reviewing related articles detailing the use of CMSs or LMSs in higher education. It is frequently quoted by several researchers that the most common and widely used LMSs in U.S are Blackboard, WebCT, Desire2Learn and Moodle (Allen, Seaman, & Sloan, 2007; Morgan, 2003; Milikowski et al., 2007; Woods, Baker, & Hopper, 2004). Since WebCT and Desire2Learn share similar features and design, the author select WebCT instead of examining both. In order to include various types of LMSs, Sakai Project and Angel Learning that can be characterized by

the projects morphed to commercial offerings and developed in the mid-1990s are also selected (Allen, Seaman, & Sloan, 2007; Fetaji, B., & Fetaji, M., 2007; Malikoswki et al., 2007). Last two LMSs, Elgg and Ning, integrated social platforms, are included to reflect and adopt social trends toward the combination of social software tools and widen the scope of this study.

The four categories were adopted and revised from the design of e-learning systems presented by Kolas and Staupe (2004) and CMS research model proposed by Snelbecker (1999). Kolas and Staupe (2004) divided the design of e-learning systems according to four different aspects:

1. Media: The channel of communication
2. Content: Systems for content building (learning objects)
3. Administration: Student/ Course/ Learning Management Systems
4. Methods: Pedagogical delivery methods

(Kolas & Staupe, 2004, p 3)

Kolas and Staupe argued that all four functionalities mentioned above had to be intertwined in e-learning systems whereas the fourth aspect "the pedagogical methods" has not been prioritized (Kolas & Staupe, 2004). In 1999, Snelbecker (1999) proposed framework called a CMS research model to suggest concrete ways of using educational theory. In this CMS research model, theory and technical features are equally considered in CMS research by studying five categories that Snelbecker (1999) included in the research model. The five categories are: (a) transmitting course content; (b) evaluating students; (c) evaluating courses and instructors; (d) creating class discussions; and (e) creating computer-based instruction (Snelbecker, 1999, p33). Malikowski et al.

(2007) studied the level of CMS adoptions for five categories in several higher educations. Category (a) transmitting course content was the most common feature by instructors followed by category (d) creating class discussions used mostly by students. Therefore, this paper tries to integrate e-learning framework (Kolas & Staupe, 2004) and Snelbecker's CMS research model (1999) to identify four critical categories that should be included in this study. The channels of communication and administration tools are adopted from Kolas and Staupe's (2004) e-learning framework. The third aspect 'Content' (Kolas & Staupe, 2004) is combined with Snelbecker's (1999) category (d) creating class discussions and (e) creating computer-based instruction to form the second feature in this paper: Productivity / Student involvement tools . Category (a) transmitting course content tools was set apart by taking third feature in this paper: Course delivery tools.

Before comparing four categories among seven LMSs, five figures below will show what each LMS interface looks like (Elgg and Ning is shown above in Figure 1 and Figure 2).

Figure 3: A sample screen shot of Blackboard interface for students

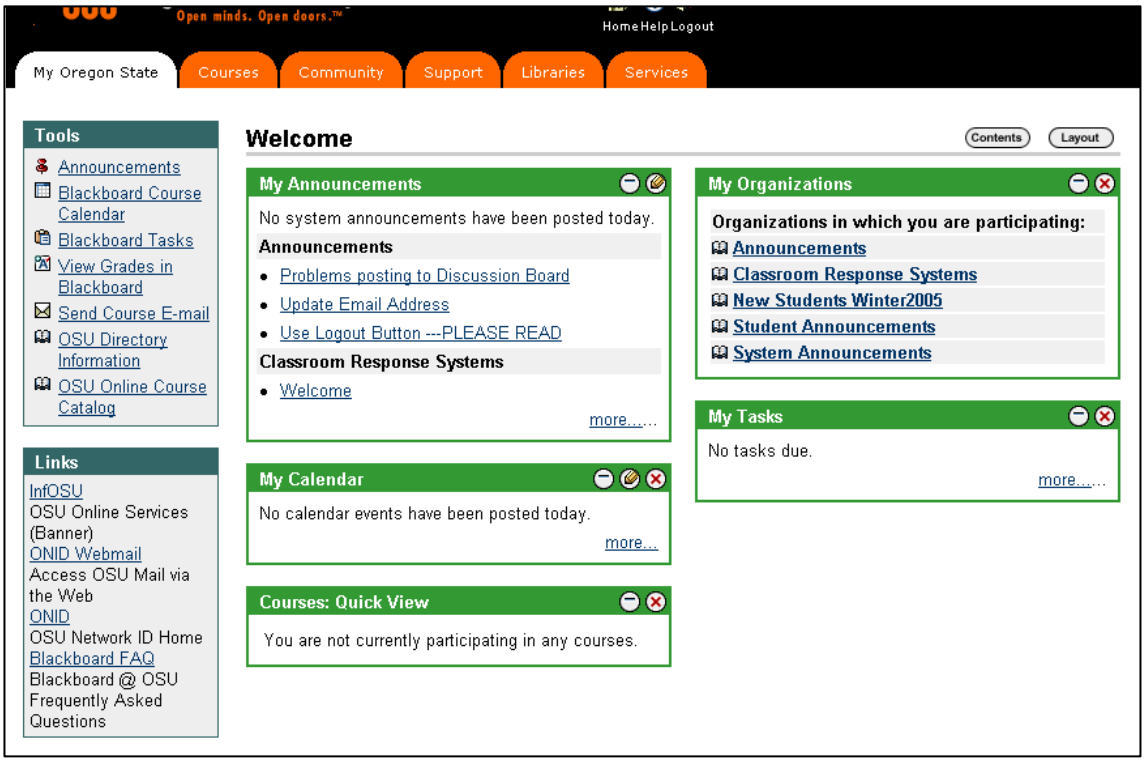

Figure 4: A sample screenshot of WebCT interface for students

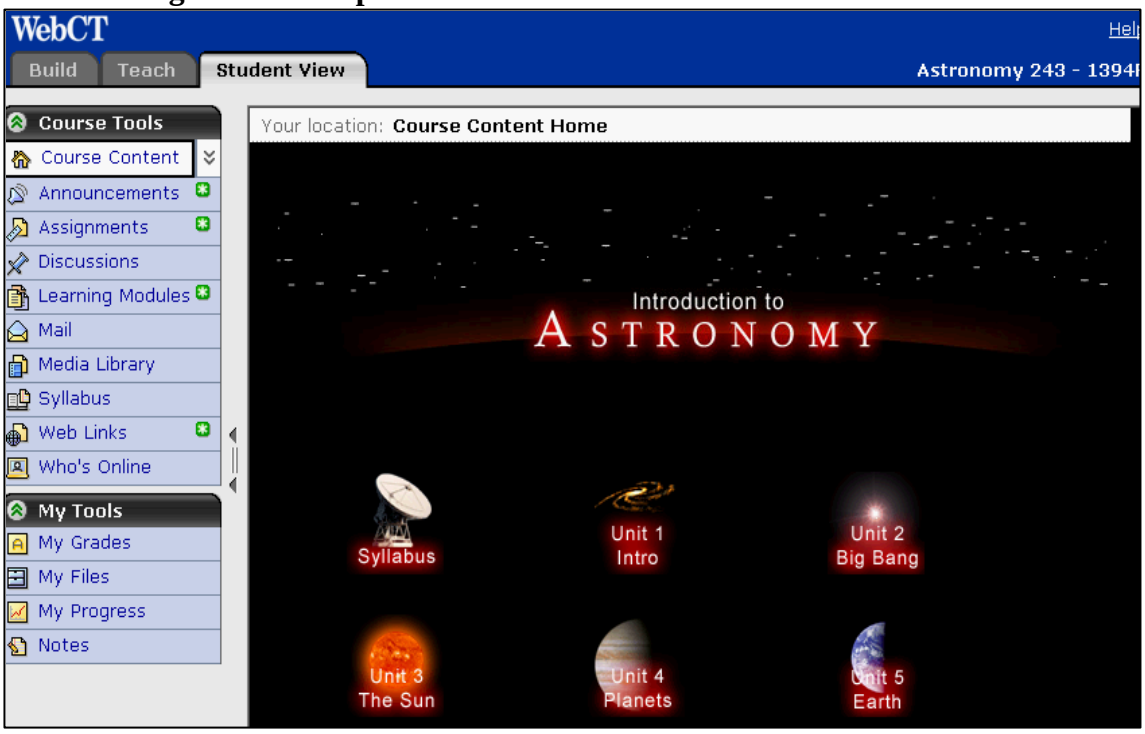

Figure 5: A sample screenshot of Moodle interface for administrators

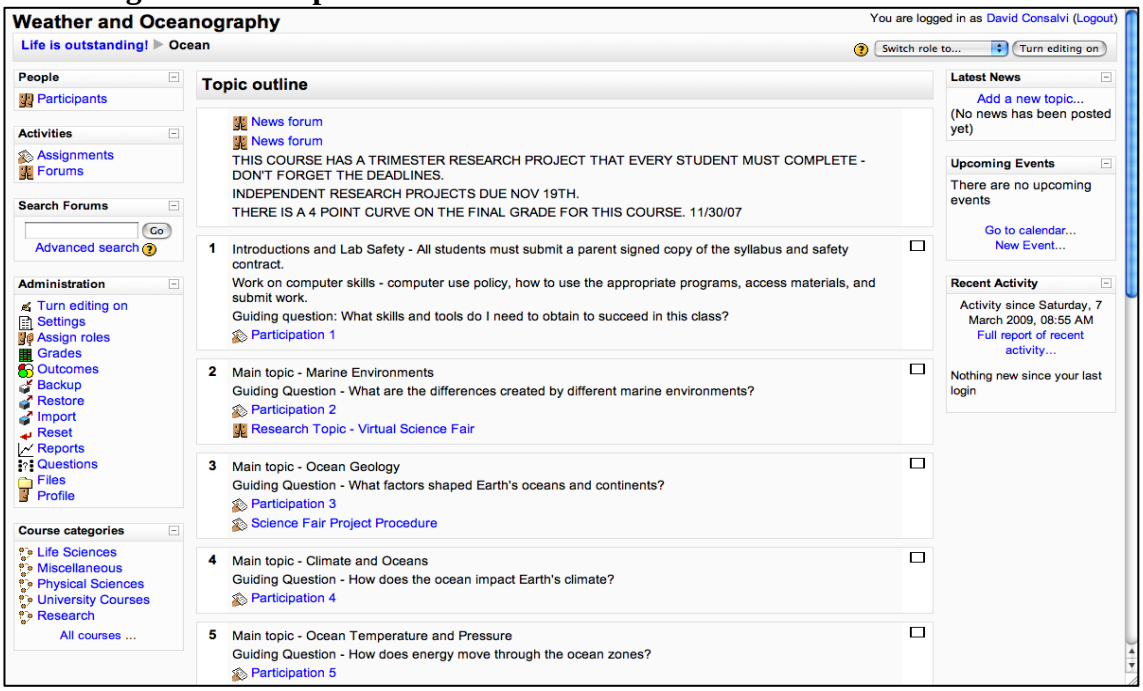

Figure 6: A screenshot of SAKAI discussion forum for students

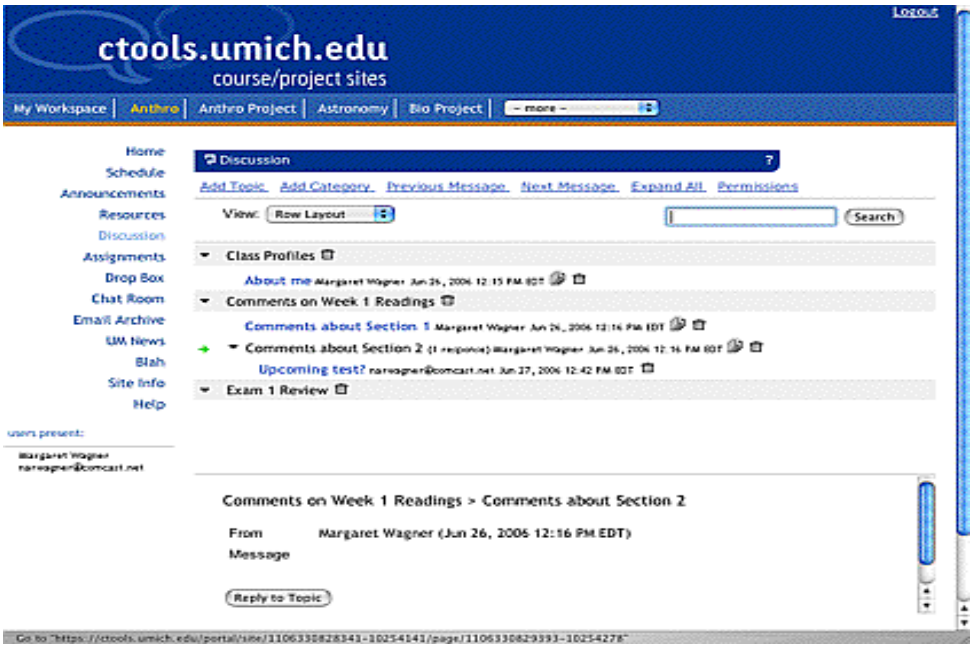

Figure 7: A screen shot of SAKAI chat screen for students

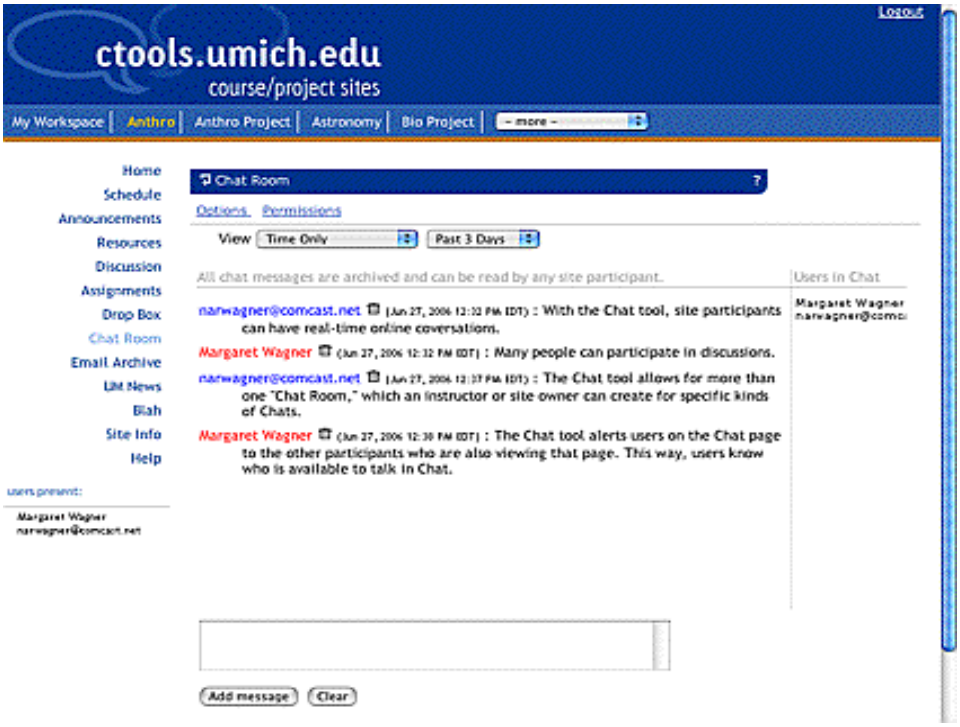

Figure 8: A sample screenshot of ANGEL interface for students

In order to compare features of each LMS according to selected categories, manuals and features of all platforms are examined. The functionality and usability information in relation to technological affordances with detailed applications are obtained by investigating commercial sites and systems. In addition to the sites and system manual, EduTools (2011) provide comparative examinations about built-in options among selected LMSs. The findings from investigating system features and EduTools(2011) are organized into four categories. After differentiating the distinctive features of LMSs, the classification of these LMSs is presented in accordance with learning framework and pedagogical utility in chapter 4.

Category 1: Communication tools

LMS features in this category involve tools where class members can interact synchronously or asynchronously. Communication tools involve the theoretical issues about student motivation and structured methods for student groups, such as cooperative

learning and peer discussions (Malikowski et al., 2007). Communication tools in category 1 are different from communicating options for delivering course contents. These tools rather imply the features that enhance students' engagements and interactions in learning directly affecting students' performance level throughout the courses. Discussion forum, file Exchange tools for sharing and modifying contents, online journal or notes and real-time chat features are examined in this category.

By looking at the features and affordances of communication tools, the comparison will be used for identifying the category where each LMS comes under. Table 3 shows how seven different LMSs support communications and interactions on the system

Table 3. Comparison of Communication tools

	Discussion Forum	File Exchange	Online Journal/Notes	Real-time Chat
Angel 6.3	- Discussions can be viewed by date, by thread, by title, by author, by group, by the type of post. - Students can categorize posts as problems, explanations, scientific explanations, comments, evaluations, or summaries. - Instructors can determine the level of involvement (read, write, or post anonymously) for students. Also can limit discussions to specific time periods.	- Students and instructors can edit their text files in their folder using a browser. - Students can upload files to a shared course or group folder. - Students can download all the contents of a folder at one time. Students can share the contents of their personal folders with other students and their instructors.	- Students can make private notes about each of their courses and may share them with their instructor. -Students can set up their personal work areas. - Students can make private notes for all their courses in one private journal.	- The chat tool supports private rooms, private messages, ability to ignore specific participants, and customized chat windows. - Instructors can moderate chats, monitor chats, suspend students from the chat rooms and view chat logs. - Instructors can schedule chats using the course calendar. Students can see who else is online within their courses and send them an instant message or invite them to a chat room.

(Table 3. Cont)

Angel 6.3	- Only the instructor may delete posts. Posts can include attachments, an images or URLs. Posts can be plain text, formatted text or html. -The entire discussion can be saved or printed for off-line reading.	- Students can submit assignments using drop boxes. - Virus detection technology can be used throughout the file upload/download process.		- The system creates archive logs for all chat rooms. The chat tool supports having many simultaneous group discussions. - The chat tool supports a structured way for students to ask questions and instructors to provide answers. - There is also a built-in instant messaging tool.
Blackboard Academic Suite	- Discussions can be viewed by date and by thread. Instructors can associate a discussion with any course content.	- Students have a private folder into which they can upload and download files. - Students can upload	Students can make private notes about their course.	- Instructors may moderate chats and suspend students from the chat rooms. - The system creates archive logs for all chat rooms.

(Table 3. Cont)

	- Posts can contain URLs, file attachments and may contain HTML. The threaded discussion software includes a formatting text editor which can create mathematic equations. - Instructors may create separate discussion environments for small groups of students and teaching assistants.	files to a shared group folder. - Students can also submit assignments using drop boxes. -Instructors can upload files to the personal folder of a student.		Instructors can view chat logs and share these with students.
Mood-le 1.5.2	*The discussion tool supports a social constructionist pedagogy model.* - Discussions can be viewed by date, by thread, by author.	- Students can upload files to a shared group folder. However, students cannot have a private folder into which they	Not available unless users use discussion forums or posts as their own note-taking pages.	- The chat tool supports images. - The system creates archive logs for all chat rooms. - Instructors can view chat logs and share these with students.

(Table 3. Cont)

	- Instructors can split discussion branches from the main discussion into a new discussion. - Instructors can determine the level of involvement (read, write, or post anonymously) for students. Posts can include attachments, an image or URL. The discussion tool includes a formatting text editor. - Posts may be peer reviewed by other students. - Students can subscribe to forum RSS feeds.	can upload and download files without sharing with other users. - Instructors cannot upload files to each student using his/her own folder.		- Instructors can schedule chats using the course calendar. - Students can see who else is online within their course and send them an instant message.

(Table 3. Cont)

Sakai 2.0	- Discussions can be viewed by category and thread. - Posts can include attachments and URLs. Posts can be plain text, formatted text, or html. Instructors can determine the level of involvement by setting the permissions (read, write, delete, etc.) for student posts.	- Students have a private folder into which they can upload and download files. Instructors can upload files to the personal folders. - Students and instructors can edit their text files in their folder using a browser.	Not available unless users use discussion forums or posts as their own note-taking pages.	- There is a basic chat tool which users can create new rooms. - Site participants can see who else is online within their course.
Web CT Campus edition 6.0	- Discussion forums can be viewed by topic, by date, and by thread. - Instructors can associate a discussion with any course content.	- Students can submit assignments using drop boxes. - Students have a private folder into which they can upload and download files.	- Students can attach notes to any page of course content. - Students can combine their notes with the	- The Java-based chat tool supports private messages and unlimited simultaneous group discussions. - Same functions as Blackboard provides.

(Table 3. Cont)

	- Instructors can limit discussions to specific time periods. Instructors can enable or disable anonymous posting, and determine whether student posts are re-editable.	- Administrators can set quota tracking on their folders. Students can also edit their text files using a browser.	course content to create a printable study guide.	
Ning	- Discussions can be done in the network's central Discussion Forum (and in any sub-groups if set up).	- Videos can be uploaded where this function is enabled by network owner. - Other files can be uploaded by users into postings or own blog posts as an attachment but cannot be deleted.	Not available unless users use discussion forums or posts as their own note-taking pages.	- Internal messaging within groups is available. Online chat can be enabled by users synchronously. However, saving chat log functions and scheduling functions according to the academic calendar is not provided.

(Table 3. Cont)

Elgg	- Discussion forums are available within groups if set up. Elgg provides each user with his/her own weblog for discussions.	- Files (of all types) can be uploaded in a personal space as well as in a group space. The space is open to the users in Elgg and can be hyperlinked using tagging functions.	Not available unless users use discussion forums or posts as their own note-taking pages.	- Internal messaging (instant messaging) within groups is available. Online chat can be enabled by users synchronously. However, the system cannot create archive logs for all chat rooms. - Instructors cannot view chat logs and schedule chats using the course calendar.

Discussions can be viewed in many ways on ANGEL 6.3 whereas other LMSs have limitations in showing discussion threads. ANGEL, Blackboard, Moodle, Sakai and WebCT provide more flexible ways of showing the discussions and forming discussion threads compare to education-based social networking platforms, Ning and Elgg. Moreover, discussion threads are expandable and collapsible to view an entire conversation on one screen except Elgg which shows all comments under the discussion in a chronological order. The features below are shared with ANGEL, Blackboard, Moodle, Sakai and WebCT, not with Elgg and Ning.

- Instructors can associate a discussion with any course content.
- Discussions can be shared across courses, departments, or any institutional unit limited within the institutional level at the end.
- Instructors may create separate discussion environments for small groups. Groups can be open to all or only a select set of students within the institutional level.

WebCT offers statistical summary of discussions displaying each user's participation which can be used to generate grades. Discussions can be saved or printed for off-line reading. WebCT also allows administrators to set quota tracking on students' folders where students can also edit their text files using a browser. The feature for file exchange and owning personal space for uploading file are flexible in Sakai, Blackboard and ANGEL. Moodle does not allow students to have their private folders into which they can upload and download files without sharing with other users.

There is a notable exception in video services on ANGEL. Instructors can include real-time video with slide or web presentations within the optional synchronous

tools on ANGEL. Course developers can integrate streamed Real audio and video into a course by using this service.

Category 2: Productivity and Student Involvement tools

Production tools were limited within CMSs in early 1990s. However, options for creating and sharing students' own products have grown with the number and complexity of social software tools. The functions implemented in LMSs are as follows:

- Bookmarks
- Tagging
- Searching within courses
- Work offline and synchronize
- Personal blog/ page
- Student community building

The traditional way of accessing and transmitting content from the Internet is shifting to a more collaborative way by implementing social networking software technologies not only to create information, but in sharing it as well (Grant, 2008). This new wave of LMS transformation is often called the advent of LCMS as Kaplan-Leiserson(2000) defined. Kaplan-Leiserson (2000) tells the difference between LMSs and LCMSs that LCMS combines the ability to create content and capability to store contents within the system.

Dieu and Stevens (2007) also stated that even though learning platforms are not originally developed for education at first, online collaboration and community networking features are interwoven as main components of these platforms,

to facilitate interaction and content creation among learners. However, not all LMSs allows diverse productivity tools.

Table 4. Comparison of productivity tools

Bookmark tools	- Bookmark tools are only available through Ning and Elgg within the system.
Tagging	- Only Elgg provide tagging feature. Elgg offers a flexible file repository system with hyperlink and tagging functions. Elgg's file repository allows users to search files, posts or interest areas among friend lists by using the tag.
Searching within courses	- Available in ANGEL, Blackboard, Moodle, Sakai and WebCT. - Elgg's tagging function can substitute the searching function.
Work offline and synchronize	- ANGEL, Blackboard, and WebCT allow students to download course content and synchronize calendar events or notes with a PDA or a CD-ROM. - Elgg allows instructors and students to compile and download the content for an entire course, discussion group content, bookmarks, and notes at the end.
Personal blog/ page	- ANGEL, Moodle, Ning and Elgg provide personal page for users to set up and customize. - Elgg offers not only personal but also group (multi-author) blogging pages. -Blackboard provides limited options for personal page. Blackboard allows students to post their photos, information and links to important websites.
Student community building	-Except Moodle, Blackboard and WebCT, students can create online clubs, interests and study groups at the system level. - Notably, Elgg supports community building and group discussions or forums with specified access restrictions.

In terms of the productivity and student involvement, Elgg appears to support users by providing flexible and customizable functions. Blackboard and WebCT only allows bookmarking, synchronize tools and limited use of personal pages compare to other LMSs that covers most of the features under the category of productivity and student involvement.

Category 3: Course Delivery tools

The most common features in this category are those that allow files to be transmitted to students, announcements to be made to an entire users, and grade information to be posted. According to Malikowski et al.'s (2007) article, about 75% of professors used a CMS to transmit files containing course content to students, such as a syllabus or class readings. Despite of the high level of LMS adoptions for transmitting course content (Malikowski et al., 2007), it is surprised to note that students show disinterests when an LMS is used as a resource for college course (Kvavik & Caruso, 2005; Morgan, 2003). Students reported that the instructors' use of technology in their courses has not significantly increased their interests in the subject matter even if students perceive an LMS as a helpful and convenient medium to deliver the course (Kvavik & Caruso, 2005). In this sense, course delivery tools would not be a sufficient condition but would be a necessary condition for students to decide the level of pedagogical usability. Even though course delivery tools are used most often across all LMS types including ANGEL, Blackboard, Moodle, Sakai, WebCT, Ning and Elgg, this category makes only subtle differences in classifying the LMS according to its educational affordances.

However, content sharing/reuse and curriculum management are examined in Table 5.

Table 5. Comparison of course delivery tools

Content sharing and reuse	- ANGEL, Blackboard, Moodle and WebCT provide options for content sharing and reuse in comparison with other LMSs. - ANGEL, Blackboard and WebCT supports sharing content across courses and institutional boundaries and creating links to content files in the central content repository. -Blackboard is equipped with the tools to enable version tracking and linking to specific versions as well as the creation management of workflows for collaborative content creation and review.
Curriculum management	- ANGEL is the only tool that supports management of curriculum and competencies. -ANGEL exclusively allows instructors to specify prerequisites and sequence of each course within the curriculum.

It is interesting to find out that ANGEL not only supports the *category 1: Communication tools, category 2: Productivity and student involvement tools*, but also *Course delivery tools* by providing wide selections to users. Ning and Elgg are not equipped with separate course delivery tools that are designed to be used in classroom environments; however, personal blogging and file sharing tools with bookmarks and tagging can be substituted with course delivery tools.

Category 4: Administration tools

As with all technologies, the design of the product is a result of its intention of

the design and perceived use. Administration tools are closely related to the default format designed by the enterprise. Today's enterprise-scale systems that are often differentiated from open-source LMSs were created to manage traditional teaching tasks as if they were business processes (Lane, 2009). Traditional LMSs such as Blackboard, WebCT were originally designed to focus on instructors' efficiency for administrative functions such as course authorization, authentication, grade posting, test creating and enrollment managements. Table 6 shows the comparison of functions such as:

- Authentication
- Course authorization
- Online grading tools
- Automated testing and scoring

Table 6. Comparison of Administration tools

Authentication	- Within all seven LMSs, administrators or Instructors can set courses to be publicly accessible or protect access to individual courses with a username and password. - Ning and Elgg allows users to be linked through sharing blogs, bookmarks and tags. - Elgg allows users to create as many groups as they like within the network even though users are not the network owners.
Course authorization	- ANGEL provides different levels of access to the system based on the following pre-defined roles: students, staff, faculty, manager, editor and system administrator. - Blackboard, Moodle, Sakai, and WebCT let administrators to create an unlimited number of custom organizational units and roles with specific access privileges to course content and tools.

(Table 6. Cont)

	- Compare to other LMSs, Ning and Elgg offer limited options for the access level however, all users including students can manage the access level within their groups; not only administrators can set the level of access to groups.
Online grading tools	- This is the function that is only available in ANGEL, Blackboard, Moodle, Sakai and WebCT whereas not in Ning and Elgg. - Within 5 LMSs above, instructors can mark assignments and grade online with providing feedback. Specific availability in terms of automated scoring system varies among different LMSs, however, it is obvious that Ning and Elgg have no functions for providing online gradebook.
Automated testing and scoring	- As described in 'online grading tools' above, ANGEL, Blackboard, Moodle, Sakai and WebCT only allows instructors to create tests, quizzes, assignments using built-in tools in the system. - Ning and Elgg don't support automated supporting and scoring system.

This category strongly influenced in classifying LMSs in accordance with pedagogical affordances. In addition to the course delivery tools, the most common CMS tools for evaluating students are a quiz generator, which can also be used to create tests and grade report (Malikowski et al., 2007). However, education-based social networking platforms, Ning and Elgg focus more on all users' freedom to create their own place to communicate and share contents. This is because Ning and Elgg had not been originally developed for education; they rather provide online collaboration and community networking features that are similar to the functions of what commercial

social networking software provides. Therefore, *the category 4: Administration tools* will provide guidelines to identify the level of control that administrators possess in comparison with students and other types of users' level of control.

CHAPTER 4. A CLASSFICATION OF LEARNING MANAGEMENT SYSTEMS

Chapter 3 compares selected LMSs according to four categories: communication tools, productivity/student involvement tools, course delivery tools and administration tools. By comparing technological features that support four main tools in LMSs, the technological capabilities and limitations of what each LMS can accomplish were discussed. Since each LMS allows different pedagogical benefits in combination with technological affordances, pedagogical utility needs to be assessed in this chapter. Therefore, Lambert's (2008) learning framework is adopted in order to identify learning patterns that can be established by utilizing each LMS and classify selected LMSs into several groups.

A classification of LMSs is proposed on the firm belief that the LMSs have an inherent purpose implied in their design as Lane (2009) commented. Inherent purposes in LMS designs also imply underlying learning goals in LMSs as each LMS has its own features suitable for supporting a specific pedagogy. However, despite the several customizable options and built-in functions, only a few researchers have studied the ways in which LMSs influence and guide pedagogy (Lane, 2009). LMSs influence pedagogy by presenting default formats designed to guide the instructor toward creating a course in a certain way.

This chapter will provide the classification of LMSs, ANGEL, Blackboard, Moodle, Sakai, WebCT, Ning and Elgg, according to the categories that are examined in chapter 3 combined with the Lambert’s (2008) learning framework. Table 7 shows the evolution of learning framework from Web1.0 to Web 2.0 that is adopted in discussing

pedagogical utility of the proposed classification in this chapter (Lambert, 2008, p.5).

Table 7. Evolution of learning from Web 1.0 to 2.0

Learning 1.0	Learning 2.0
● Formal and structured learning ● Instructor led, Web-based, virtual and blended ● Command and control; Top-down, push ● Centralized content creation ● Management hierarchy ● Scheduled, pre-fixed, planned ● Company-identified experts ● Managed formal events	● Informal and collaborative learning ● Blended, blogs, wikis, Q&A, search ● Bottom-up; peer to peer, pull ● Grassroots content creation ● Mentoring, knowledge networks ● Tags ● Real-time, just in time ● Community identified experts ● Enabled knowledge exchange

Lambert's (2008) *Learning 1.0* and *Learning 2.0* framework is adapted to define pedagogical utility of LMSs which will be interwoven with the basic utility and the capability of LMSs that are discussed in the chapter 3. Pedagogical utility is defined here as "the capability of the system to enable teaching and learning by facilitating or supporting key facets of the entire instructional system, from learner through instructor through instructional design and tools" (Lambert, 2008, p.2).

Proposed classification of LMSs

Basic usability and capability of each LMS are identified according to the four

main features decided in chapter 3:

- Communication tools
- Productivity / Student involvement tools
- Course Delivery tools
- Administration tools

These features provide the core factors to divide each categorization of LMS that will be proposed in this section. Along with this basic usability issues, pedagogical utility is examined. Table 8 shows the classified groups of LMSs (each categorization is named as group 1 to 3)

Table 8. Proposed categorization of LMSs

<table>
<tr><th></th><th>Group 1</th><th>Group 2</th><th>Group 3</th></tr>
<tr><td>LMSs</td><td>Blackboard Academic Suite,
WebCT
ANGEL 6.3</td><td>Sakai 2.0
Moodle 1.5.2
ANGEL 6.3</td><td>ANGEL 6.3
Ning
Elgg</td></tr>
<tr><td rowspan="2">Comm-unication tools</td><td>● Instructors can create discussion board and determine the level of involvement of students
● Synchronous and asynchronous communication is supported within the course members
● The system inherently supports the archive logs for all chat rooms.
● More than 3 steps are needed to read messages together posted under the same topic.</td><td>● Instructors can create discussion board and forums as well as students.
● Students are not allowed to set the level of involvement and access level.
● Sakai lacks the archive logs for all chat rooms whereas Moodle offers limited archive logs for designated chat rooms.
● Easier than group 1 to read topics/threads instead of just viewing individual posts.</td><td>● Instructors and students have same level of control over the discussion board in terms of creating, setting the access level and forming groups with selected users.
● Students and instructors are all allowed to set the level of involvement and access level.
● Lacks the archive logs for all chat rooms except ANGEL 6.3.
● All discussions and comments are shown under the discussion topics (parent posts and comments are all shown together)</td></tr>
<tr><td colspan="2">● Synchronous and asynchronous communication tools are supported within the course members.</td><td>● Communication tools can be limited within the institutional level; however, if allowed, all users in Ning and Elgg network can do instant messaging.</td></tr>
</table>

(Table 8. Cont)

Productivity/ Student involvement tools	● Searching within the course tool is available. ● Personal profile page options are limited. ● Students cannot create online clubs, interests and study groups at the system level.	● Personal profile page options are various than Group 1. ● Files can be uploaded and downloaded within personal space as well as a group space but students cannot create folders for their own use.	● Files (of all types) can be uploaded in a personal space as well as in a group space. The space can be open to the users in the system (not only limited to the students registered in the course) and can be hyperlinked using tagging functions. ● Students can create online clubs, interests and study groups at the system level. ● Ning and Elgg allows users to be linked through sharing blogs, bookmarks and tags.
Course delivery tools	● The availability of course format layout is pre-defined.	● The availability of course format layout is varied by providing different formats.	● Posting and blogging is used to construct course format layout; Elgg and Ning do not have pre-defined formats for content delivery layout.
Administration tools	● Only an administrator has the control over the system.	● Administrators can create an unlimited number of custom organizational units and roles with specific access privileges to course content and tools.	● Once it is allowed by network owner, administrators, students and instructors have same level of control over the system.
	● Grading report tools and automated testing/ scoring functions are available.		● No tools available for the grade report or test development.

Based on the categorization shown in Table 8, pedagogical usability can be predicted. For pedagogical systems, instructional designs of LMSs such as features, tools and interface define much of the context of use, teaching strategies, learning methods. The instructional design therefore has to specify the system acceptability for pedagogical usability which means practical acceptability in authentic educational settings. Table 9 shows how each categorized group can support different types of teaching and learning.

Table 9. The type of teaching and learning suitable for each group

	Group 1	Group 2	Group 3
Most suitable for	● Traditional teacher-directed approach ● Large class/ undergraduate courses ● Supportive administrator and technicians	● Traditional teacher-directed approach ● Blended learning/ supplementary use for off-line class ● Supportive administrator and technicians ● Experienced instructor with the use of LMS feature	● Constructive learner(user)-centered approach ● Problem-based learning ● Case learning ● Distance learning ● Student interactions/ group works/ graduate course
Learning Frame-work	Learning 1.0 framework	Can be used for the goals of Learning 1.0; Effective but limited capability for the goals of Learning 2.0 framework	Learning 2.0 framework

The suitable use of classified groups shown in Table 9 is guided by the inherent purpose and design of each LMS in terms of technological affordances. However, when instructors and administrators acquire a breadth and depth of knowledge that will provide a well-balanced understanding of the issue involved in crafting an LMS to avoid limits and enhance usability, this classification can be more fluid. At least, this guidance for use can provide a list of hindering factors or supporting factors specific to one's institution that will most likely be encountered.

System acceptability and pedagogical usability of classified groups

LMSs in group 1 can be described by Meerts' (2003) definition of a CMS that a CMS is simply a tool that enable teachers to be able to easily create a web accompaniment to their courses to support some kinds of learning and provide some efficiency benefits. The most common feature of *group 1* is focusing on managing students, courses, assessment, grading and instructors' needs. LMSs under the category of *group 1* are suitable for large class size and instructor-led classroom. Limited functions of interaction, collaboration and co-creating work leads to formal and structured learning as *Learning 1.0* framework shows. LMSs under the category of group 1 need well-prepared technicians and experienced supporters because of the top-down way of control and centralized content transmission system.

Group 2 has wider options for course managing tools; however, because of the lack of offering community identified experts, tags, limited network connections within users and mentoring availability group 2 can afford limited portion of Learning 2.0 framework whereas group 3 is more suitable for *Learning 2.0 framework*. Group 2 needs experienced instructor with the technicians who have the background in instructional design to fully manipulate by using various features. Group 2, mainly open-source LMSs, supports wide variety of educational affordances for group work, collaboration, social connections and customization, instructors' availability to adapt the tools for teaching strategies is important.

LMSs under the category of *group 3* are not originally developed for educational uses which have been called as social-network based platforms rather than typical LMSs. The prominent features shown in group 3 are the support for tagging,

bookmarking, community building, and personal space that play an insignificant role in group 1 and group 2. Elgg is the only LMS that allows all users to create their own web pages, customize personal page, and create their own use of wikis for personal or group use whereas other LMSs need the administrators' permissions. These unique features enable the constructivist way of learning and *Learning 2.0 framework*.

Figure 9 below visualizes how each LMS specifies the notion of context use according to its system acceptability.

Figure 9: The visualized figure of LMSs' categorization

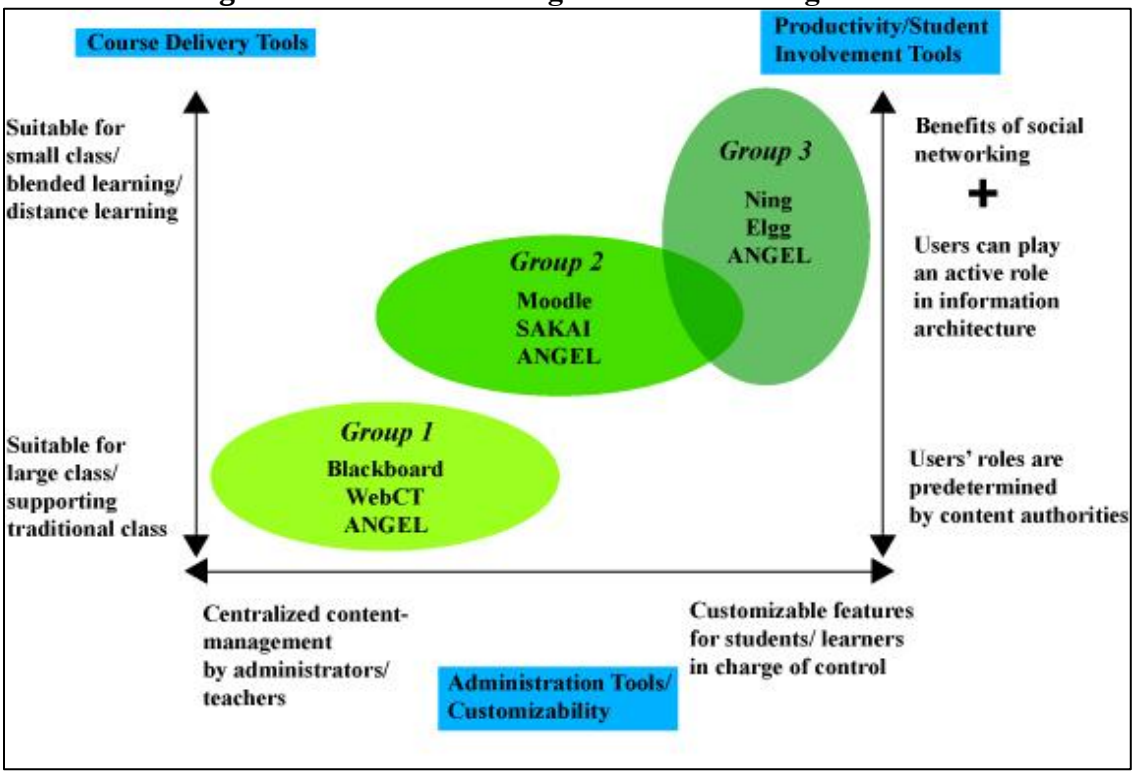

Figure 9 shows how three LMS groups support teaching and learning with practical considerations in relation with different features. It is interesting to see that ANGEL is applicable to all three groups. ANGEL delivers powerful pattern recognition of online student activity and allow faculty to easily automate appropriate actions.

ANGEL is designed to support personal productivity and organization by personalize their ANGEL Home with more than 30 resource options, themes included in (EduTools, 2011) . At the same time, ANGEL's ease of use encourages faculty and students to embrace new methods to support active learning without the hassle of separate logins and unfamiliar navigation (EduTools, 2011). These distinctive features enable ANGEL to come under all three categories that not only supports instructors' ability to control and manage courses by adapting their strategies to different situations but also supports learners' active participation by providing maximum options for personal productivity and customizability.

With the exception of ANGEL, group 1 lacks the ease of use for learners to freely explore and develop personal learning space. Even some options may be restricted to particular operating systems. This hinders flexible content management and knowledge construction of both the teachers and learners resulting in the limited use of *group 1* for large classroom where transmitting content, announcement, assignments and grading accounts for most of LMS uses. Faculty may use it as a form of knowledge presentation, that is, to present knowledge in organized collections of information and ideas (Woods et al., 2004). In this way, instructors use *group 1* as a "course home page" to make course documents, lectures and other information available to students in an effort to more efficiently manage traditional classroom procedures. Unlike *group 2* and *group 3*, *group 1* tracks student usage of courses and posts so that instructors can obtain statistics on all students or individual students within the limited time. Students can also track their own progress by viewing the Gradebook which is missing in *group 3*.

Group 2 can embrace the use of *group 1* however, not necessarily. Since *group*

2 supports personal blog and discussion forums, enabling personalized tools in large classroom can lead to the misuse of these tools to confuse instructors and learners. Users' roles are predetermined to some extent; however, discussion forums, blog posts, and file repositories provide wide variety of options to learners.

Group 3 includes social networking features, essential features for interaction, collaboration and contribution in Web 2.0 era. One of the challenges in the hybrid approach is the loss of face-to-face contact and careful attention to personalizing online exchange (Woods et al., 2004). Group 3 is effective in forming a sense of "community" necessary for successful learning outcomes by building social presence in online course. Elgg and Ning share similar platform in terms of social networking sites however, there are different purposes and potential uses between Elgg and Ning.

Table 10. Different uses of Elgg and Ning

	Elgg	**Ning**
Most suitable for	● Relatively large class compare to Ning ● More suitable for educational use with a need for a private, organization-only membership for social networking and/or collaborative working	● Individuals or organizations that want to create one main network (with a number of sub-groups) who have a personal choice whether they wish to join or not - primarily for social networking and discussion
Distin-ctive Features	● Social-media rich (integrated) platform ● Functionality for collaboration ● Complete customization of functionality and look and feel	● Networking for a well-defined group of people

Both the Elgg and Ning lack grading/assessment tools built in the platform; however, *group 3* meets the new process of innovation that moves from a top-down to a bottom-up model which means the emergence of new online social structures in which power is located not in institutions but in communities (Craig, 2007). Even the data produced by individual users, such as bookmark lists within Elgg or Ning, become "social" as users tag, aggregate and publish their bookmarks in collaborative sites such as del.ci.ous. In terms of pedagogical practices, content is no longer owned to instructors or institutions, no longer transmitted to passive learners, but appropriated, shared and constructed by learners even though content can be owned by any users including instructors or administrators theoretically. The current trend of LMS developments move toward the integrated form of *group 2* and 3 discarding the drawbacks of *group 1*. In respond to this, the categorized group is presented in this paper for further examinations and analysis in the future.

CHAPTER 5. CONCLUSION

Several research studies have covered effective pedagogical strategies for online teaching (Coates, et al., 2005) but not specifically for LMSs. If LMSs are having widespread effects on the structure of university teaching, they are obviously affecting student study habits and learning strategies. Investigating this point involves analyzing the general dynamics of LMSs and features. Despite growing recognition of the importance of LMSs, little research has done into how the adoption of LMS as a vehicle for learning is creating new patterns and strategies of teaching and learning.

As it is stated in the first chapter, LMSs are not pedagogically neutral technologies, but rather, through their very design, they influence instructors' teaching strategies and guide learners' individual learning patterns. As the systems tend to address the learning needs of future students, researchers put endeavors to identify how to shape and define teachers' expected use of LMSs, imaginations and behaviors. It is important to consider that LMS will play a major role in higher education increasing our attention to how academics learn LMS to teach.

There is not yet a general understanding of the built-in pedagogy of LMSs. Within the significant transformation of our learning environment, higher education institutions are constantly trying and operating new technologies without fully considering learning paradigms. It is becoming easier for instructors and learners to tailor LMSs to suit their own needs; however, the lack of the research studying successful adoption of diverse LMSs results in monolithic uses of LMSs. It is expected that this paper can initiate the discussions about classifying LMSs in terms of

educational affordances and defining the best use of LMSs for different learning goals and strategies.

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